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ABSTRACT

The reader-centered emphasis dominating the current literature reflects an assumption that what is learned from text, and how much is learned, is determined primarily by the reader. An alternative thesis, however, is that much of the responsibility for text comprehensibility may lie with the producer of the text. That is, the text needs to be constructed so that readers have exactly one direct antecedent for marking concepts as being related, and the hierarchically arranged text macrostructure reflects the writer's perspective about what is important. This can be accomplished through staging, because it provides a mechanism whereby writers can develop coherent text in which preposition and sentences are connected and organized into a macrostructure reflecting the writer's salient ideas. Staging has three primary characteristics: (1) a set of author decisions that directly affect the structure and form of a message; (2) a set of instructions for determining the prominence of ideas in text, and for analyzing text for prominence; and (3) a means whereby authors control what is recalled by readers. The staging structure of text gains clarity when the hierarchy is represented. Although a somewhat time consuming and cumbersome procedure at first, with patience and practice, staging can be applied to text with relative speed and ease, and can prove useful in the production of well-structured, coherent text. (HOD)

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STAGING AND TEXT COMPREHENSIBILITY: IT'S WHAT'S UP FRONT THAT COUNTS

E. Russell Klauk, Ph.D.

During the past decade there has been considerable research interest in discourse production, discourse analysis, and reading comprehension. Interdisciplinary cooperation among cognitive psychologists, linguists, reading theorists, and educators has resulted in the creation of conceptual tools capable of analyzing and quantifying the interface between discourse and memory. This development has increased our understanding of many variables associated with the production of written discourse and the cognitive processing of text.

Discourse analysis and reading comprehension research is now indicating that the writer-text-reader relationship is both complex and interactive. The bulk of this research, however, tends to focus primarily on the reader's role in the relationship and neglects the role of the writer. For example, text processing studies typically suggest that to extract meaning from written discourse readers must construct event chains for discourse, or locate and map the organizing characteristics, or identify and analyze cohesive elements, or diagram the top-level structure used by the author. Recommendations for those who produce written discourse are quite uncommon.

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The reader-centered emphasis that dominates the current literature reflects an assumption that what is learned from text, and how much is learned from text, is determined primarily by the reader. An alternative thesis however, is that much of the responsibility for text comprehensibility may lie with the producer of the text. What follows is an examination of this assertion. Text is considered to be any written, non-narrative discourse exclusive of drawings, pictures, maps, charts, graphs, glossaries, appendices, and the like. The purposes of the discussion are (1) to relate current theoretical notions of discourse processing to discourse production, (2) to describe staging, a dimension of discourse which indicates the structural importance of ideas in both the text and the minds of readers, and (3) to propose that staging may be an important element in discourse production and text comprehensibility.

Properties of Text

Structure and coherence are the two properties which distinguish text from a collection of sentences. A major thrust of recent research has been to identify and examine structural variables which affect learning and remembering, to explain which elements in text contribute to coherence, and to provide insight into pragmatic matters such as reading, writing, and teaching.

Text Structure. A basic principle derived from emerging views in cognitive psychology is that there are two levels of structure within text: the microstructure and the macrostructure. The microstructure of text consists of within-sentence relation-

ships of propositions and between-sentence relationships. Sentences are the basic structure units within which propositions act as information units, although neither is considered discourse sensitive.

The macrostructure of text interacts with the microstructure and reflects the organization of information. Among the indices of text organization are the number of propositions connected to a thematic unit, the relationship of new information to previously mentioned (old) information, and the elements within text which have been given psychological prominence.

Coherence. Text coherence can be viewed as subsuming two aspects - cohesion and staging. Cohesion is the dependence of one word, proposition or sentence in a text on some previous word, proposition or sentence (Halliday and Hasan, 1976). Cohesion may also include the relationship of what is being said in a text to knowledge which is presupposed outside the text.

Staging (Grimes, 1975) relates to the manner in which a text communicates a point of view within the propositional content of that text by marking within-sentence information as either topic or comment, and by marking between-sentence information as either new or old. Grimes' notion of staging is similar to both foregrounding (Chafe, 1972) and thematic organization (Lesgold and Perfetti, 1977). Topic/comment and old/new distinctions within text form patterns which can be ordered hierarchically, height indicating the relative degree of prominence ascribed to ideas by the author. In the following sets of sentences, staging would

account for set one being easier to process than set two.

SET ONE

1.1 I am trying to find a dog.
1.2 That dog bit a little girl yesterday.
1.3 The little girl was scared, but not hurt.

SET TWO

2.1 A dog bit a little girl yesterday.
2.2 The little girl was scared, but not hurt.
2.3 I am trying to find that dog.

In 1.1 the dog is new information and the comment of the sentence. In 1.2 the dog is old information and the topic, while the little girl is new information. The topic of 1.3 is the little girl, old information from 1.2. Thus, no new information appears in topic position in 1.2 or 1.3. All information is staged high, is connected to the first sentence in the discourse, and remains actively in the mind of the reader.

In 2.1 both the dog and the little girl are staged high. However, the reader would not accord the same status to the speaker when introduced as a new topic in 2.3. In addition, were both of these discourses to be extended, upon the next mention of the speaker, the reader would consider the speaker less important in set two than in set one.

This phenomenon is not unlike many theatrical productions. When an actor is in the center of the action, both the spotlight and the audience's attention are focused at that point. When another actor assumes center-stage, however, the first actor loses both the spotlight and the audience's notice. In text,

the longer a concept is on center-stage or "up front" the more likely it is that the reader will treat that information as being important. Thus, the longer information doesn't participate in the action the more likely it will fade from the reader's mind, often retreating "into the wings" entirely.

Text Comprehension

The goal of readers is to extract knowledge from text. Among the assumptions made by readers is that text is structured and coherent. While text retains structure and coherence, comprehension proceeds automatically; when structure and coherence break down, however, reading times are increased, learning is obstructed, lower scores occur on tests of comprehension, and readers become confused and discouraged.

The influence of text structure on comprehension has been well-documented. Text analysis and comprehension research has shown that adults are sensitive to organizational structures (Kintsch and Keenan, 1973), and are influenced by structural importance (Johnson, 1970; Meyer and McConkie, 1973). The hierarchical structures in text have been found to affect the recalls of adults (Clements, 1976; Meyer, 1976; McKoon, 1977; Eamons, 1978-1979; Marshal and Glock, 1978-1979) and children (Waters, 1978; Evans, 1978-1979; Tierney, Bridge and Cera, 1978-1979; Meyer, Brandt and Bluth, 1980; Taylor, 1980; Klauk, 1982; McGee, 1982). Danner (1976) has shown that this awareness of text structure may begin as early as age 10. Furthermore,

Wilhite (1982, 1982) has found that pre-passage questions directed at information at the top levels of hierarchical structures facilitate the processing of the central organizing idea. When answering questions, readers appear to locate information as a result of a top-down search of the hierarchical structures which were constructed during reading.

The manner in which the text macrostructure is processed is of major concern to cognitive psychology. Current models of the psychological processes involved in text comprehension propose that as the first sentence of a text is read, a parsing mechanism flags new information, part of which is marked as the current topic. Each successive sentence is then interpreted in terms of what preceded it. Additional incoming sentences contain some old information redundant with preceding sentences, but not all of this information is equivalent. Since only a limited number of propositions can be held in short-term memory (STM) at any given time, special status is accorded to current topic, recent information, and high-level propositions; the current topic, however, becomes the primary element for relating incoming information to old information (Chafe, 1982; Haviland and Clark, 1974; Kintsch and van Dijk, 1978). Since readers' expectations about the topic of the next sentence and the nature of the new information depend upon information staged high in the structural hierarchy, when these expectations are satisfied, processing is rapid (Perfetti and Lesgold, 1977; Lesgold, Roth and Curtis, 1979).

Sentence integration hinges on which aspects of the current sentence are interpreted as containing old information, i.e. which concepts are linked. Old information appears to require less processing capacity since it is a reinstatement of something already comprehended (Carpenter and Just, 1978; Perfetti and Lesgold, 1977). Also, when intervening propositions address different topics, antecedent information tends to deactivate. Lesgold, Roth and Curtis (1977) have shown that when concepts are linked early in the text, a subsequent occurence of a concept facilitates reinstatement. Kintsch, et. al. (1975) have shown that, given two passages of equal length and number of propositions, passages with fewer different concepts are read faster and recalled better.

When incoming information is accepted as coherent with the contents of STM, automatic processing continues. When it is not accepted, processing is interrupted and a search of previously processed information must be activated. Memory searches have been found to make heavy demands on readers' cognitive resources and contribute significantly to difficulty of comprehension (Kintsch and van Kijk, 1978). When text does not provide explicit antecedents for new information, the reader must spend time relating sentences by constructing cohesive ties, i.e. inferring relationships. Stone (1980) has shown that readers comprehend text more rapidly when sentences are cohesively connected rather than inferentially connected. And whenever "inferencing" occurs there exists the possibility of an erroneous connection. Moreover,

any information not integrated or connected inferentially is lost eventually.

In sum, research seems to indicate that if there is overlap between incoming information and the contents of STM the input is processed with little cognitive referencing and search interruptions. In addition, when hierarchically arranged sequences of propositions with co-referential relationships are processed, propositions at the top levels receive preferential processing.

The crux of the issue is that the psychological salience of various text elements must be regulated for comprehension to proceed smoothly. Thus it seems logical to conclude that the initiator of the text is the one who must exert this control. Furthermore, text needs to be constructed so that readers have exactly one direct antecedent for marking concepts as related and the hierarchically arranged text macrostructure reflects the writer's perspective about what is important.

Staging

Staging is important to the production of text because it provides a mechanism whereby writers can develop coherent text in which propositions and sentences are connected and organized into a macrostructure reflecting the writer's salient ideas. Staging has three primary characteristics:

1. staging is a set of author decisions that directly affect the structure and form of a message;

2. staging is a set of instructions for determining the prominence of ideas in text, and for analyzing text for prominence; and
3. staging is a means whereby authors control what is recalled by readers.

Clements (1976) has demonstrated quite convincingly that information is better recalled by adults when it is staged higher in a passage than when it is staged at a lower level. Consider these two versions of the same semantic content:

Insert Passage 9 here

Insert Passage 10 here

Now examine the staging charts for these passages.

Insert Staging Chart - Passage 9

Insert Staging Chart - Passage 10

In free, cued, and delayed recall, Clements' data showed that information chunk G was better recalled in Passage 9 than in Passage 10. Chunk H was better recalled in Passage 10 than in Passage 9. Chunk I was recalled better in Passage 10 than in Passage 9.

In a related investigation, Klauk (1982) found that sixth-

graders better recall propositions staged high in commercial textbooks than propositions staged low. Both the Clements study and the Klauk study indicate that the organization of a message exerts a high level of control over the comprehension process. In addition, these studies suggest that a staging analysis of text makes it possible to predict which components of a message have the highest and lowest probabilities of being remembered. Furthermore, these studies question the primacy-recency effects of serial position theory. The Clements study showed that passages could be constructed to agree with or destroy serial position effects. Data from the Klauk study indicated that recent information staged low in the hierarchy was not always well-remembered. These findings are significant for text production and comprehension, and contain implications for comprehension measurement, test construction, and for development and application of questioning strategies.

Staging Rules. The methodology for staging text developed by Clements is considered to be a reasonable reflection of current linguistic thought and a working model which will undergo modification as a result of additional research.

Insert Staging Rules and Procedures here

Staging Charts. The staging structure of text gains clarity when the hierarchy is represented in chart form. To illustrate

the application of staging rules and the construction of staging charts, consider the following example:

> Grapes for wine-making require a temperate climate but table grapes flourish in warmer climates. California provides the climatic range needed for both kinds of grapes. Californian vineyards produce high quality wines but some regions of California are too warm for wine-producing grapes. Warmer climates produce grapes with a high sugar content. Such grapes are good to eat but are not ideal for wine-making.

By definition, the first topic, Grapes for wine-making, assumes the highest level in the hierarchy. If the passage had had a title, the title would have been the first topic. In sentence 1, table grapes is coordinated with Grapes for wine-making and thus retains the same level. In sentence 2, California is new information and is placed one level lower in the hierarchy. Californian vinevards in sentence 3 is additional new information and is placed one level lower than the previous topic. Through coordination, some regions of California is assigned the same topic level as California vinevards. In sentence 4, Warmer climates is old information because it was first mentioned as a comment in sentence 1, and is assigned the same level as its first mention. Such grapes was mentioned as a comment in sentence 4 and is therefore assigned the same topic level. Following the coordinator in sentence 5, there is a surface structure deletion of such grapes. The staging chart indicates this deletion with parentheses. The following staging chart represents the hierarchical structure of the passage:

Insert the "Wine-making" Chart here

This staging chart indicates that information in sentence 3 is not likely to be recalled as well as other information in the passage. Should this be information the author believes salient and should the author wish readers to remember this information, one form the passage could take would be:

> Grapes for wine-making require a temperate climate but table grapes flourish in warmer climates. The climate needed for both kinds of grapes can be found in California. California has vineyards that produce high quality wine but some regions are too warm for wine-producing grapes. Warmer climates produce grapes with a high sugar content. Such grapes are good to eat but are not ideal for wine-making.

In this "re-staged" version, prominent information is retained at a high level in the hierarchy. Repetition and explicit coordination have been used to structure the passage so that incoming information is connected to old information with direct antecedents. The added coherence thus reduces the reader's cognitive search and referencing activities. Research tells us that when writers assist readers in this manner, comprehension retains its speed and automaticity, writer's important ideas are "up front" and available to readers, and there is a high probablitiy that the author's important ideas will be remembered.

Concluding Remarks

In the preceding discussion I have suggested that authors begin to view discourse more from the reader's perspective than from the writer's. I have described staging and illustrated its application, and argued that staging might be useful in the production of well-structured, coherent text.

One of the virtues of staging is that it conforms nicely to current models of text comprehension. Staging is not proposed as a fully developed system, however; nor is it suggested as the only, or the best, method of organizing text. In its present form, staging does not account for every grammatical construction possible in English. Consequently, inconsistencies can be expected as individual linguistic intuitions are invoked when novel grammatical constructions are analyzed.

Although a somewhat time-consuming and cumbersome procedure at first, with patience and practice, staging can be applied to text with relative speed and ease. Eventually, the mechanics can be discarded in favor of a visual inspection for hierarchical structure and "connectedness." Nevertheless, some additional effort will be required of writers if they wish to insure that the message intended is, in fact, the message comprehended.

As one composes text, a guiding principle needs to be: "If you want your important ideas remembered, place them on center-stage." Or, stated somewhat differently and in words borrowed from a commercial advertisement of some years ago: "Remember, it's what's up front that counts!"

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Passage No. 9

Friction is often neglected in the study of ideal machines but it is a very important factor in any real machine. Friction may vary greatly from time to time in a given machine. It depends on such factors as rust and lubrication. The efficiency of a machine is a ratio between energies. It is the ratio between the useful energy gotton out of a machine and the total energy put into the machine. Efficiency may theoretically reach a value of unity but it is always less than unity in practice. The efficiency of a machine would be unity only if friction were zero. The mechanical advantage of a machine is a ratio between forces. It is the ratio between the force exerted by a machine and the force exerted on a machine. Mechanical advantage may be less than unity or greater than unity and may have any value theoretically. Students often confuse mechanical advantage and efficiency. Actual mechanical advantage is not the same as ideal mechanical advantage. Actual mechanical advantage is always less than ideal mechanical advantage in practice and would be the same as ideal mechanical advantage only if friction were zero.

G

I

H

Passage No. 10

Students often confuse mechanical advantage with efficiency. The mechanical advantage of a machine is a ratio between forces. It is the ratio between the force exerted by a machine and the force exerted on the machine. Mechanical advantage may be less than unity or greater than unity and may have any value theoretically. Actual mechanical advantage is not the same as ideal mechanical advantage and it is always less than ideal mechanical advantage in practice. Friction is often neglected in the study of ideal machines but it is a very important factor in any real machine. Friction may vary greatly from time to time in a given machine. It depends on such factors as rust and lubrication. Actual mechanical advantage would be the same as ideal mechanical advantage only if friction were zero. The efficiency of a machine is a ratio between energies. It is the ratio between the useful energy gotten out of the machine and the total energy put into the machine. Efficiency may theoretically reach a value of unity but it is always less than unity in practice. The efficiency of a machine would be unity only if friction were zero.

H

G

H

I

STAGING CHART - PASSAGE 9

	SIGNAL	MARKER	TOPIC	COMMENT
G	START		FRICTION	IS OFTEN NEGLECTED IN THE STUDY OF IDEAL MACHINES.
	CODRD	BUT	IT	IS A VERY IMPORTANT FACTOR IN ANY REAL MACHINE.
	OLD		FRICTION	MAY VARY GREATLY FROM TIME TO TIME IN A GIVEN MACHINE.
	OLD		IT	DEPENDS ON SUCH FACTORS AS DUST AND LUBRICATION.
I	NEW		* THE EFFICIENCY OF A MACHINE	IS A RATIO BETWEEN ENERGIES.
	OLD		* IT	IS THE RATIO BETWEEN THE USEFUL ENERGY GOTTEN OUT OF A MACHINE AND THE TOTAL ENERGY PUT INTO THE MACHINE.
	OLD		* EFFICIENCY	MAY THEORETICALLY REACH A VALUE OF UNITY
	CODRD	BUT	* IT	IT ALWAYS LESS THAN UNITY IN PRACTICE.
	OLD		* THE EFFICIENCY OF A MACHINE	WOULD BE UNITY ONLY
	SUBORD	IF	** FRICTION	WERE ZERO.
H	NEW		** THE MECHANICAL ADVANTAGE OF A MACHINE	IS A RATIO BETWEEN FORCES.
	OLD		** IT	IS THE RATIO BETWEEN THE FORCE EXERTED BY A MACHINE AND THE FORCE EXERTED ON THE MACHINE.
	OLD		** MECHANICAL ADVANTAGE	MAY BE LESS THAN UNITY OR GREATER THAN UNITY
	CODRD	AND	** (IT)	MAY HAVE ANY VALUE THEORETICALLY.
	NEW		*** STUDENTS	OFTEN CONFUSE MECHANICAL ADVANTAGE AND EFFICIENCY.
	NEW		**** ACTUAL MECHANICAL ADVANTAGE	IS NOT THE SAME AS IDEAL MECHANICAL ADVANTAGE.
	OLD		**** ACTUAL MECHANICAL ADVANTAGE	IS ALWAYS LESS THAN IDEAL MECHANICAL ADVANTAGE IN PRACTICE
	CODRD	AND	**** (IT)	WOULD BE THE SAME AS IDEAL MECHANICAL ADVANTAGE ONLY
	SUBORD	IF	***** FRICTION	WERE ZERO.

STAGING CHART - PASSAGE 18

	SIGNAL	NUMBER	TOPIC	COMMENT
	START		STUDENTS	OFTEN CONFUSE MECHANICAL ADVANTAGE WITH EFFICIENCY.
	OLD		THE MECHANICAL ADVANTAGE OF A MACHINE	IS A RATIO BETWEEN FORCES.
	OLD		IT	IS THE RATIO BETWEEN THE FORCE EXERTED BY A MACHINE AND THE FORCE EXERTED ON THE MACHINE.
H	OLD		MECHANICAL ADVANTAGE	MAY BE LESS THAN UNITY OR GREATER THAN UNITY
	COORD	AND	(IT)	MAY HAVE ANY VALUE THEORETICALLY.
	NEW		* ACTUAL MECHANICAL ADVANTAGE	IS NOT THE SAME AS IDEAL MECHANICAL ADVANTAGE
	COORD	AND	* IT	IS ALWAYS LESS THAN IDEAL MECHANICAL ADVANTAGE IN PRACTICE.
	NEW		** FRICTION	IS OFTEN NEGLECTED IN THE STUDY OF IDEAL MACHINES
	COORD	BUT	** IT	IS A VERY IMPORTANT FACTOR IN ANY REAL MACHINE.
G	OLD		** FRICTION	MAY VARY GREATLY FROM TIME TO TIME IN A GIVEN MACHINE.
	OLD		** IT	DEPENDS ON SUCH FACTORS AS RUST AND LUBRICATION
	OLD		* ACTUAL MECHANICAL ADVANTAGE	WOULD BE THE SAME AS IDEAL MECHANICAL ADVANTAGE ONLY
H	SUBORD	IF	** FRICTION	WERE ZERO.
	OLD		THE EFFICIENCY OF A MACHINE	IS A RATIO BETWEEN ENERGIES.
	OLD		IT	IS THE RATIO BETWEEN THE USEFUL ENERGY GOTTON OUT OF A MACHINE AND THE TOTAL ENERGY PUT INTO THE MACHINE.
	OLD		EFFICIENCY	MAY THEORETICALLY REACH A VALUE OF UNITY
I	COORD	BUT	IT	IS ALWAYS LESS THAN UNITY IN PRACTICE.
	OLD		THE EFFICIENCY OF A MACHINE	WOULD BE UNITY ONLY
	SUBORD	IF	* FRICTION	WERE ZERO.

STAGING RULES AND PROCEDURES

1. Topic-Comment Rule

   Identify the topic and comment of each clause and simple sentence. The topic contains all information preceding the main verb in the sentence. The comment includes all the remaining information.

2. Old-New Rule

   Decide whether the topic is new (never mentioned previously) or old (mentioned in an earlier topic or comment). If new, assign it one level below the previous topic. If old, assign it the same level as its first mention. If no plausible evidence for a distinction can be determined, assign the topic as old, thereby reducing the depth of the hierarchy. The question should always be: Does the author intend a distinction?

3. Coordination Rule

   If a topic is coordinated with an earlier topic or comment, assign it the same level as that earlier topic or comment. Coordination can be either explicit or implicit. Explicit coordination markers are words such as: and, but, however, therefore, nonetheless, so, and nevertheless. Coordination is implied through: (a) referents, (b) examples which follow a higher-order rule or category, and (c) alternation of

lexical choices to avoid repetition. Coordination is also implied if a new topic is the answer to a question, if it contrasts with an earlier topic, or if it is to be anticipated by a previous topic.

4. Subordination Rule A

   Topics of embedded sentences or subordinate clauses are assigned one level below the topic of sentences in which they are embedded or to which they are subordinated. Explicit subordination is marked by subordinators such as: that, which, where, when, how, because, while, in order to, except, until, even though, although, and who; and complementizers such as: for, to, and that.

5. Subordination Rule B

   New topics which follow an embedded sentence or clause are assigned one level below the last unembedded or unsubordinated topic, unless they are otherwise coordinated.

6. Minimum Depth Rule

   An old topic is never placed lower in the hierarchy than it would be placed if it were a new topic.

7. Precedence Rule

   Explicit signals always take precedence over implicit signals.

8. Conflict Rule

   In cases of conflict, the higher numbered rule takes precedence over the lower numbered rule.

9. The level of the first topic of a paragraph will depend upon its coordination with the first topic of other paragraphs.

10. Topics within paragraphs cannot be assigned levels higher than the first topic of that paragraph.

11. Non-verb Construction

Temporal and locative information, normally considered subordinate, when "fronted", however, assumes topic status. The sentence "At a very early age he was taught to read." would be analyzed as follows:

Signal	Marker	Level	Topic	Comment
New, nv		5	At a very early age	
New, v			he	was taught to read.

The sentence is considered to have two topics. The first topic has as its comment "he" which in turn becomes a topic having its own comment.

12. Extraposed Questions

"It is apparent that you don't like me." is considered to be an answer to the question "What is apparent?" The analysis takes this form:

Signal	Marker	Level	Topic	Comment
New Extrap		3	It is apparent	
Ans Extrap	that	3	you	don't like me.

The comment of the first topic becomes a separate topic with its own comment, retaining the same level.

13. Sentences with "dummy" items (such as it) refer to events or states without actors or objects. In the sentence "It was a good book." the entire sentence is considered a topic.
14. When in doubt about whether a distinction between lexical items is intended or an attempt has been made to alleviate repetition, consider the second mention as old information.
15. When there is uncertainty about implied coordination between two topics, assume no coordination.

STAGING CHART FOR WINEMAKING PASSAGE (Version 1)

Signal	Marker	Level	Topic	Comment
Start		1	Grapes for winemaking	require a temperate climate
Coord.	but	1	table grapes	flourish in warmer climates.
New		2	California	provides the climatic range for both kinds of grapes.
New		3	Californian vineyards	produce high quality wine
Coord.	but	3	some regions of California	are too warm for wineproducing grapes.
Old		1	Warmer climates	produce grapes with a high sugar content.
Old		1	Such grapes	are good to eat
Coord.	but	1	(such grapes)	are not ideal for winemaking.

FLOWCHART OF STAGING DECISIONS